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THE SUPPLY DECISIONS OF MEN AND WOMEN PHYSICIANS

by

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ABSTRACT

National survey data on 4,510 men and 558 women physicians in office-based private practice were used to explain differential work effort. Using two-stage least squares techniques, hours worked and weeks worked equations were estimated separately for men and women physicians. The supply of women physicians was found to be insensitive to higher imputed wages, while the supply of men physicians was actually backward-bending. Contrary to conventional wisdom, childcare responsibilities do not constrain the hours worked by women physicians. However, our results show significant reductions in work effort among married women physicians, but not men, implying subordination of careers by women where combined family incomes are high.

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INTRODUCTION

The last 10-15 years have witnessed a dramatic change in the role of women in medicine. Although women still constituted only 10 percent of all patient care physicians by 1979, this represents an increase of almost two-thirds since 1967.[1] These figures underestimate long-term trends in the relative supply of women physicians, furthermore, given the length of time required to actually produce a physician. Over the last decade, the percent of medical students who are women has almost tripled; by 1977, almost one out of every four medical students (23.8%) was female.[2]

Forecasts of physician supply have been based almost solely on male physicians. Because women physicians appear to work fewer hours,[3] these forecasts will be underestimated if the changing sexual mix is not taken into account. Furthermore, because the cost of medical education is so high, it is important that society achieve the same return on its investment in the education of women physicians as in that of men. To do so, we need to learn how to encourage women physicians to work harder. Since women tend to choose specialties (such as psychiatry) or employment arrangements (e.g., salaried practice) associated with shorter work weeks, however, simple cross-tabular results may be deceiving. Sloan[4] confirmed the reduced work effort of women physicians holding these and other factors constant, but Vahovich did not.[5] Both of these studies estimated supply equations including a dummy variable for the sex of the physician. The only study that has examined supply behavior for men and women physicians separately is that by Barbara Kehrer.[6] She found a few differences, most notably that men appear to respond positively, and women negatively (but not significantly), to higher earnings, but did not explicitly test the backward-bending supply hypothesis.

According to this hypothesis, once the physician achieves a certain earnings level, he/she will choose an extra hour of leisure over an extra hour of work, when fees increase. In this paper, we test the backward-bending supply hypothesis directly and also examine the role of family responsibilities in the supply decisions of both men and women physicians.

DATA SOURCES

The primary data bases for this analysis are the physician surveys conducted by the National Opinion Research Center (NORC) for the Health Care Financing Administration (HCFA). Each survey was a nationally representative sample of office-based, private practice physicians in fifteen specialties: allergy, cardiology, dermatology, gastroenterology, general and family practice, general surgery, internal medicine, neurological surgery, obstetrics-gynecology (OB-GYN), ophthalmology, orthopedic surgery, otolaryngology, pediatrics, psychiatry, and urology. An extensive questionnaire was administered to all physicians by telephone, with an overall response rate of 70 percent. This questionnaire included data on practice costs, work effort, size and type of practice, physician income and fees. All information was based on physician self-reports.

A major stumbling block in studies of women physicians has been inadequate sample sizes, especially for specialty-specific analyses. Two years of comparable HCFA-NORC survey data (1978-1979) were available, and female physicians from the two surveys were pooled for analysis, yielding a total sample of 558. As each survey was a nationally representative sample of physicians, no bias was introduced by doing so. All monetary variables were deflated, based on the Consumer Price Index and expressed in 1977 dollars. The comparison group of male physicians was drawn from a single survey (1978), with a total sample size of 4,510.

The HCFA-NORC surveys differ in several key respects from the AMA's Periodic Surveys of Physicians often used in other studies of women physicians. First, only office-based, private practice physicians were included in the HCFA-NORC surveys, so specialties such as anesthesiology (which is particularly popular among women) are omitted. Second, group practices with more than nine fulltime physicians were excluded, such as clinic arrangements and health maintenance organizations, for example. Women physicians, however, are more likely to gravitate to the latter type of settings, ostensibly because of their more regular work hours. Finally, survey physicians must have had the same practice during all of the preceding year and to have worked at least 20 hours per week. If women physicians are more apt to work part-time or part of the year, they will have been disproportionately excluded. Thus, our sample is not representative of all U.S. women physicians, and will not be directly comparable with findings reported from other surveys. This sample, however, has the advantage of being much more comparable with our sample of men physicians, particularly along those dimensions expected to influence work effort.

WORK EFFORT OF MEN AND WOMEN PHYSICIANS

Table 1 presents the hours spent per week in patient care and the weeks worked per year by specialty for men and women physicians. Because women are disproportionately represented in specialties such as psychiatry that traditionally have short work weeks,[7] it is important to adjust for specialty differences when making comparisons between male and female physicians. Thus, Table 1 provides both unadjusted and adjusted means for the female sample, where the latter has been weighted by the male specialty distribution.

Although men average almost three hours more per week than women, the differential is more than halved once we adjust for specialty differences (see

Table 1). Even this small difference (1.3 hours) will affect earning power over the long run, however; it amounts to 62 hours during the course of a year, or the equivalent of another week and a half in practice. (There are no real differences in weeks worked per year, probably due to the sampling definitions used.)

For the most part, women physicians work fewer hours per week regardless of specialty. The differences are most marked for women psychiatrists who work 4 hours less (36 vs. 40 for men) and women OB-GYNs who work 6 hours less (47 vs. 53). One major exception is women GPs who report working 53 hours per week, considerably more than their male colleagues (49 hours).

ECONOMETRIC ANALYSIS OF DIFFERENCES IN WORK EFFORT

Empirical Specification

Two dependent variables were specified; (1) hours spent in patient care activity per week; and (2) the number of weeks worked in the last year. Variable definitions and means can be found in Table 2.

Explanatory variables can be grouped in five categories: (1) wage and income; (2) personal characteristics; (3) household characteristics; (4) specialty and practice characteristics; and (5) area characteristics. WAGE was specified as the physician's predicted net hourly (or weekly) income, based on net income equations estimated for male and female physicians, separately.[8] Because we were interested in explicitly testing the backward-bending supply hypothesis, the predicted wage variable was also specified in squared form ($\widehat{WAGESQ}$). If physician supply is backward-bending, then $\widehat{WAGE}$ and $\widehat{WAGESQ}$ should be positive and negative, respectively, as work hours increase with higher wages but then fall at some critical wage level. Physicians with substantial nonemployment income have been shown to work less[9]; NONPRACY is a dummy variable set equal to one if the physician

reported at least $10,000 in nonpractice income during the past year.

Personal characteristics include the physician's age and foreign medical graduate (FMG) status. Younger physicians are expected to work harder as they seek to establish themselves in practice, while older physicians should display declining work effort due to decreased patient demand and possible health problems. To capture this inverted U-shaped relationship, physician age was specified in both linear and squared form (MDAGE, MDAGESQ). FMGs have been shown to work fewer hours[10], presumably because of cultural differences in work-leisure preferences.

The major reason women physicians are believed to work fewer hours than men is their household responsibilities, particularly the care of young children. Despite the very high opportunity cost of her time, the woman physician is usually considered to be relatively more efficient in household activities, an assumption reinforced by traditional societal attitudes. The empirical evidence to date, however, is equivocal. Using 1960 census data, Sloan found that being a parent negatively affected the hours worked by women physicians but not men, but was unable to confirm these results with 1970 data.[11] The sample of women physicians in both years was very small, however (about 101 and 64 in 1960 and 1970, respectively) and the number with children even smaller. Kehrer found that married women physicians worked significantly fewer hours than their unmarried colleagues, but preschool children had no effect.[12] Marital status had no impact on male physicians' work effort, and the children variable was not included in her male equation. Men physicians with young children, however, may conceivably work harder than nonparents, especially in an era of escalating education costs. We specified two measures of household characteristics: a dummy variable set equal to one if the physician is married, and a dummy variable if the physician has any children under 18 years of age (KIDS). Both variables are included regardless of the sex of the physician. In an earlier specification, the KIDS variable

was limited to pre-school children, but it was not significant in either equation. (The number of minor children was also insignificant.)

Work effort will also vary as a function of practice organization. Because there is no financial return to marginal work effort, salaried employees are expected to work fewer hours than their entrepreneurial colleagues. In addition, physicians may select that type of employment because of stronger preferences for leisure. Similarly, a desire for more regular work hours and shared on-call responsibility leads physicians to enter group practice.[13] Because of such preferences, coupled with revenue-sharing arrangements that may discourage work effort, group physicians are hypothesized to work less than their solo colleagues. GRP is set equal to one if the physician practices in a group with other physicians, and zero otherwise. Because of casemix differences, some specialties will work more regular, and possibly shorter, hours than others. In addition, physicians may choose certain specialties because of income-leisure preferences. For example, psychiatrists' workloads tend to be the same week after week with few (if any) emergencies, while OB-GYNs may have to work at all hours of the day or night. Six specialty dummies are included to capture these differences: IM, OB, PED, PSYCH, MED, and SURG for internists, OB-GYNS, pediatricians, psychiatrists, other medical and other surgical specialists, respectively. General practitioners represent the omitted category.

Finally, in physician-scarce areas, physicians will need to work longer hours in order to provide services to all who need care. Thus, the physician-population ratio (MDPOP) will be negatively related with both our dependent variables.

Estimation Methods

A total of four regression equations were estimated: hours worked and weeks worked for men and women physicians, separately. Since the physician's

time-worked decision and his/her imputed wage are simultaneously determined, OLS will yield biased estimates. Instead, two-stage least squares was used, with a predicted hourly (weekly) income variable derived in the first stage included in our second-stage estimates of hours (weeks) worked.

Empirical Results

Four regressions are shown in Table 3, presenting hours and weeks worked for men and women physicians, respectively. Many of the variables are statistically significant in the hypothesized directions, but with some noteworthy differences between male and female physicians. The R-squares in eqs. (2) and (4) are quite small compared to those in eqs. (1) and (3) due to the lack of variation in weeks worked. (The coefficient of variation associated with work weeks was only 6 percent in both the male and female equations, compared with 30-32 percent for the hours worked variable.)

These results confirm Kehrer's finding that men and women physicians are located on different parts of their respective supply curves. Men physicians respond positively to higher net hourly incomes ($\widehat{WAGE}$), but with work effort falling after income reaches some critical level ($\widehat{WAGESQ}$). (Weeks worked appear generally insensitive to variations in weekly earnings, although there is a slight negative response evident for male physicians.) Women physicians, on the other hand, are not responsive to increases in hourly net incomes (at least within the observed range), implying that they are on the vertical portion of their supply curve. Higher imputed wages neither increase or decrease work effort. Thus, if policymakers wish to encourage women physicians to work harder, they must seek some means other than prices which raise their marginal value and incomes.

Although raising fees would induce some men physicians to expand their work hours, the net supply increase would probably be negative. The coefficients associated with the two wage terms in eq. (1) imply that their

critical wage level, the point at which the supply responses of men physicians turns negative, is $26.85, considerably below the sample mean of $29.64. Almost one-half of men physicians in our sample (about 48 percent) earn net hourly incomes above this critical level and hence are on the backward-bending portion of their supply curves.[14] Supply elasticities are fairly small, however: -0.09, for example, evaluated at the means. Thus, a 10 percent rise in hourly incomes would lead physicians to shorten their work week by only half an hour, ceteris paribus. Price increases, nevertheless, would reduce, not increase work effort. (Absolute physician supply, of course, could still increase, if more persons are attracted into the medical profession by high incomes.)

A large outside source of income definitely discourages work effort, but the impact is much larger for women physicians. Women physicians enjoying nonpractice incomes of at least $10,000 a year (NONPRACY) work almost seven hours less per week than do their less wealthy colleagues. Surprisingly, nonpractice income has no effect on hours worked by male physicians, although it does lead to a significant, but small, reduction in weeks worked. These results, coupled with those for WAGE, suggest that men and women physicians respond differently to the source of increases in income. Why this should be the case is uncertain, especially since we have held household responsibilities constant and since NONPRACY does not include spouse's earnings.

Physician age shows the expected inverted U-shaped relationship with hours worked, but only for male physicians. In the early stages of their careers, men physicians work longer hours, reaching a peak work week at about age 44; they then begin to reduce their work effort due to decreased demand, failing health, etc. The absence of an apparent age trend among women physicians may be due to a mix of career practice patterns in our sample. For example, the age-work patterns for some women physicians may resemble those of men, while others may show much higher levels of work effort later on in life when child

care responsibilities are completed. (Our KIDS variable will not capture these historical trends, because women physicians working only part-time or opting out of the market altogether would not have been included in our sample.) A second physician characteristic, FMG status, had no effect on work effort for either men or women physicians.

Both men and women physicians respond to household responsibilities in making their supply decisions, but in somewhat different ways. Married women physicians work significantly fewer hours than their single colleagues, while marital status has no effect on work hours of men physicians. (Married physicians of both sexes work fewer weeks per year, possibly to spend vacation time with spouses.) Why do married women shorten their work weeks so dramatically (by almost 3 hours on average)? It is not because of child-care responsibilities, because these are captured by our KIDS variable. Instead, we are undoubtedly observing an income effect. The husbands of women physicians are apt to be high income professionals in their own right, often other physicians,[15] while the wives of men physicians average much lower incomes, if they are working at all. Given their much higher family incomes, married women physicians have chosen to substitute "leisure" for market work.

Most surprising is the impact of young children on work effort. Women physicians with children work the same hours as their childless peers while men physicians with children actually work longer hours. (Having children increases weeks worked per year for both men and women physicians.) These findings contradict the conventional wisdom that children adversely effect the work effort of women physicians while having no effect on that of men. (It must be remembered, however, that women physicians, who may have chosen to work less than half-time or not at all because of childcare responsibilities, were not included in our sample.) Like fathers elsewhere, the need to support a family drives men physicians with children to work harder.

Male physician employees work significantly less than their more entrepreneurial colleagues as expected, almost 4 hours less per week and over

a week less a year, but there is no difference among women physicians. It had been hypothesized that group physicians would work less than their peers in solo practice, both because of financial arrangements that may discourage work effort and because of leisure preferences leading them to choose group practice in the first place. We see from eqs. (2) and (4) that group physicians of both sexes do work fewer weeks per year, but that they actually work significantly more hours per week (eqs. 1 and 3), and the net effect is positive. It may be that our GROUP variable is too crude, encompassing a variety of revenue and expense-sharing arrangements with differing incentives for work effort; even still, this does not explain such a strong, positive finding.

Specialty differences in work effort are generally consistent in both the male and female regression equations. Virtually all specialists work less than GPs, with psychiatrists not surprisingly having the shortest work weeks. Compared with GPs of the same sex, male psychiatrists work 8 fewer hours per week, and female psychiatrists 14 hours less.

Finally, in physician-sparse areas, male physicians exhibit significantly longer work hours as expected, although the elasticity associated with MDPOP is quite small: -0.09 in eq. (1). The work effort of women physicians, on the other hand, appears impervious to the relative supply of other physicians. While we have no explanation for this insignificant effect, it should be noted that, based on our first-stage income equation, the hourly incomes of women physicians are also insensitive to physician density.[16]

SUMMARY AND CONCLUSIONS

Descriptive survey data have consistently shown that women physicians work fewer hours per week than their male colleagues. Given society's tremendous investment in medical education, we would like to know how to encourage women physicians to work as hard as their male colleagues. To determine this, we

estimated separate hours-worked, or supply, equations for men and women physicians using two-stage least squares techniques. The results suggest that: Women physicians are unresponsive to increases in hourly earnings, implying they are on the vertical portion of their supply curve, while the supply of men physicians is definitely backward-bending at the average imputed hourly wage. Thus, raising fees would have no impact on the work effort of women physicians and would actually encourage men physicians to cut back their work hours.

In addition, our results suggest that household composition and responsibilities play a much more important role in the supply decisions of both men and women physicians than previously thought. First of all, being married significantly reduces the work effort of women physicians, but does not affect that of men. Second, contrary to the conventional wisdom, childcare responsibilities do not constrain the hours worked by women physicians, and actually encourage men physicians to work harder. These differences tell an interesting story about traditional male and female roles in this country's highest paid profession. Women physicians are usually married to other high income professionals, often other physicians, whereas the wives of men physicians earn much lower incomes, if they are working at all. In female physician households with high family incomes, it is the women physician who generally decides to reduce her medical activity, subordinating her career to her husband's. When there are children, however, both men and women physicians work harder to support them rather than cutting back their hours.

This is not to say that child care responsibilities have no impact on the supply decisions of women physicians. Women physicians who have chosen to work less than 20 hours per week or to drop out of the labor market were not included in our sample, yet may have made those decisions based on the presence of young children. Nevertheless, those woman, who are actively

practicing medicine, do not restrict their work hours because of minor children.

Physician supply projections that do not take into consideration either the changing sexual composition of the stock or the inelastic (or negative elastic) responses to higher and higher earnings may underestimate future physician requirements. This assumes of course that future female medical school graduates make the same labor supply decisions as women physicians have in the past. Changing societal attitudes about the appropriate spousal and parental roles, however, may lead both men and women to alter their preferences for leisure and market work.

Reductions in public subsidization of medical education may also inadvertently alter supply decisions by requiring new entrants to go into considerable debt. This may encourage women graduates to remain full-time in the medical market after marriage to pay off incurred debts. This benefits society, of course, by forcing all physicians, women as well as men, to place a more realistic value on the high cost of their medical training.

NOTES AND REFERENCES

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2. Lorna E. Wunderman, "Female Physicians in the 1970's Their Changing Roles in Medicine," pp 51-66 in G.L. Glandon and Roberta J. Shapiro, eds. Profile of Medical Practice (Monroe, Wisconsin: AMA, 1980).

3. Joel D. Bobula, "Income Differences Between Male and Female Physicians," pp. 123-133 in G.L. Glandon, and Roberta J. Shapiro, eds., Profile of Medical Practice (Monroe, Wisconsin: AMA, 1980); Barbara Kehrer, "Factors Affecting the Incomees of Men and Women Physicians: An Exploratory Analysis," Journal of Human Resources 11: 526-45, Fall 1976; Frank A. Sloan, "Physician Supply Behavior in the Short Run", Industrial and Labor Relations Review 28: 549-69, July 1975; Stephen G. Vahovich, "Physicians, Supply Decision by Specialty: 2SLS Model", Industrial Relations 16: 51-60, February 1977.

4. Sloan (note 3).

5. Vahovich (note 3).

6. Kehrer (note 3).

7. Psychiatrists accounted for 15 percent of the female sample, but only 7 percent of the male sample. Women physicians were also more likely to specialize in pediatrics and to be under-represented in the surgical specialties (except OB-GYN).

8. Independent variables for the first stage income equations included: specialty, years of experience, board-certification, foreign medical graduate status, employee status, and market conditions (per capita income and physician density). The reader is referred to Janet B. Mitchell, "Explaining the Income Differential between Men and Women Physicians" (Center for Health Economics Research, February 1984) for more detail.

9. Sloan (note 3).

10. Ibid.

11. Ibid.

12. Kehrer (note 3).

13. Frank A. Sloan, Jerry Cromwell, and Janet B. Mitchell, Private Physicians and Public Programs. (Lexington, MA: D.C. Heath, 1978), pp 50-60.

14. By contrast, Vahovich (note 3) found the critical wage level to be well above the mean in his sample of primary care physicians. Nevertheless, one-third of physicians still earned hourly incomes above this level.

15. Kehrer (note 3) presents survey data on this point.

16. Mitchell (note 8).

TABLE 1

WORK EFFORT FOR MALE AND FEMALE PHYSICIANS

	Hours Per Week			Weeks Per Year		
	Male	Female		Male	Female	
		Unadj.	Adj.		Unadj.	Adj.
General Practice	49.1	53.1	--	47.7	48.6	--
Internal Medicine	47.8	46.3	--	47.4	47.8	--
OB-GYN	52.8	46.9	--	46.9	47.2	--
Pediatrics	47.8	45.7	--	47.6	47.3	--
Psychiatry	40.5	36.2	--	47.3	46.6	--
Other Medical Specialties	43.8	40.5	41.3	46.9	46.6	46.8
Other Surgical Specialties	49.0	44.0	45.7	46.9	46.7	47.1
All	48.2	45.4	46.9	47.3	47.4	47.6

Note: Hours are self-reported for patient care and do not include administrative activities.

TABLE 2

VARIABLE MEANS AND DEFINITIONS

Name	Definition	Means	
		Male	Female
HRS	patient care hours worked in last week	48.18	43.82
WKS	number of weeks worked in last year	47.24	47.05
$\widehat{WAGE}$	predicted net hourly (weekly) wage	29.64 (1341.06)	24.94 (1022.76)
$\widehat{WAGESQ}$	WAGE squared	908.38 (1,885,884)	648.54 (1,135,056)
NONPRACY	physician has nonpractice income > $10,000	0.17	0.19
AGE	physicians' age	50.62	51.30
AGESQ	AGE squared	2,690.34	2,772.65
FMG	physician is foreign medical graduate	0.12	0.25
MARRIED	physician is married	0.93	0.71
KIDS	physician has at least 1 child under 18	0.58	0.50
EMPLOYEE	physician is salaried employee	0.02	0.04
GROUP	physician practices in a group	0.36	0.29
IM	physician is internist	0.15	0.15
OB	physician is OB-GYN	0.10	0.12
PED	physician is pediatrician	0.06	0.14
PSYCH	physician is psychiatrist	0.07	0.15
MED	physician is other medical specialist	0.06	0.06
SURG	physician is other surgical specialist	0.29	0.13
MDPOP	physicians per 1,000 county population	1.82	1.98

TABLE 3

HOURS AND WEEKS WORKED 2SLS REGRESSIONS FOR MALE AND FEMALE PHYSICIANS

	Male		Female	
	Hours (1)	Weeks (2)	Hours (3)	Weeks (4)
$\hat{WAGE}$	1.4179***	0.0013	0.3003	0.0012
$\hat{WAGESQ}$	-0.0264***	$-7.2*10^{-7}$*	0.0017	$-6.5*10^{-7}$
NONPRACY	0.5352	-0.2788**	-6.8135***	-0.4084
AGE	0.9217***	0.0195	0.4741	-0.1302
AGESQ	-0.0105***	-0.0003	-0.0064	0.0012
FMG	0.4012	-0.1956	-2.2276	-0.4981
MARRIED	0.9132	-0.4066**	-2.8335**	-0.6260**
KIDS	1.9162***	0.4378***	1.3453	0.6663**
EMPLOYEE	-3.7890***	-1.3061***	-4.6852	-0.2901
GROUP	2.6051***	-0.6994***	2.3588*	-0.8107***
IM	-1.8979**	-0.1880	-3.1798	-0.4327
OB	2.0917*	-0.3954	-2.9215	-0.7955
PED	-2.8267***	0.0057	-6.1729***	-0.7270
PSYCH	-8.3036***	-0.5753***	-14.5859***	-1.3929***
MED	-4.2861**	-0.5422**	-13.0423*	0.5356
SURG	0.1731	-0.4697*	-6.0781	-1.4742
MDPOP	-1.5502***	-0.1549***	-0.5976	-0.1899
Constant	12.6097*	47.7332	38.1215**	51.6449***
R^2(c)	0.11	0.04	0.17	0.06
F (df)	33.49*** (17,4389)	12.10*** (17,4389)	7.99*** (17,541)	3.14*** (17,541)

***Significant at the one percent level.
**Significant at the five percent level.
*Significant at the ten percent level.

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